RATCHET LINK

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention pertains to coupling devices generally, and more particularly to a chainable link which, when used in an articulating assembly, provides for pivotal ratcheting of adjacent links between various positions.

2. Description of the Background Art

Pivotal coupling devices are used in many applications where two or more components are joined together in a manner that allows movement of the components in relation to each other. A common pivotal coupling device is a hinge, and a number of hinge assemblies have been previously developed. For example, U.S. Pat. No. 3,000,049 issued to Terry, Jr. on Sep. 19, 1962, discloses a plastic hinge and method of making the same having two leaves, one of which has spaced apart coaxial knuckles with integral stub pintles, and the other leaf having one knuckle with sockets in each end. The stub pintles of the one leaf have beads which correspond to depressions in the sockets of the other leaf, so that when the two leaves are fitted together, they can articulate in a ratchet fashion. U.S. Pat. No. 3,118,167 issued to Morris et al. on Jan. 21, 1964, discloses a door checking appliance having two hinge leaves, one of which has a hollow cylinder with a spindle mounted rotatably within, and the other leaf having a one way clutch device connected to the spindle. A damping fluid is contained in the annular space defined by the spindle and cylinder, and the spindle and cylinder can have grooved or serrated surfaces to provide a ratchet effect. U.S. Pat. No. 4,506,408 issued to Brown on Mar. 26, 1985, discloses a ratchet hinge structure having male and female components which mesh so that the components can lock relative to each other in various positions. The related male and female surfaces can have serrations or bumps to allow ratchet articulation.

Another common pivotal coupling device is a "link" found in the assembly known as a "chain". Such chains are used in many different types of machines to couple two or more sprockets for transmission of rotational motion. In such applications, the chain is held in a taught position under the urge of a spring or other force in order to control the degree of articulation at various points along the chain.

A number of other coupling devices have also been developed. For example, U.S. Pat. No. 5,172,534 issued to Milner et al. on Dec. 22, 1992, discloses chainable building blocks wherein a plurality of detachably chainable links pivotally attached to each other by snap fitting protrusions into indentations. Detents are provided at a plurality of pivot positions so that engaged links can be held in stable positions relative to each other. U.S. Pat. No. 5,209,693 issued to Lyman on May 11, 1993, discloses a toy block set with flexible connectors on opposing ends wherein projections on one face of building blocks can be wedged into sockets on another face of other building blocks in a manner that allows lateral pivoting of one block relative to another. U.S. Pat. No. 1,678,709 issued to Schurmann on Jul. 31, 1928, discloses a sectional or link shaft having flat link plates with forked end portions, with a generally circular opening between the forked ends of the link plates. A flat disk with transverse notches in its periphery links two shafts together by fitting forked ends into the transverse notches. U.S. Pat. No. 4,548,590 issued to Green on Oct. 22, 1985, discloses a construction element having a body with resiliently openable claws at each end. Construction elements attach to each other by claws on different elements engaging each other or by claws on one element engaging the body of another element. U.S. Pat. No. 5,049,104 issued to Olsen on Sep. 17, 1991, discloses a connecting means for a toy building set which includes a connecting system having first and second coupling parts complementary to each other. The connecting parts interconnect building elements by connecting first and second coupling parts while one coupling part is stressed and the other is relaxed. U.S. Pat. No. 4,617,001 issued to Parein on Oct. 14, 1986, discloses elements of a construction or assembly set wherein detachable links are formed by a first link having two generally spherical ends and a second link having two slots capable of receiving the spherical ends of the first link. The joined links are pivotable about the spherical links in the slots.

As can be seen therefore, a variety of coupling devices have been devised for use with doors, toy building blocks, and in connection with other applications. However, none of those devices provide for a chained assembly of articulating links capable of pivotal movement in finite, precise, clicking units, wherein lateral movement is also prevented. Therefore, there is a need for a chainable coupling device which can be quickly, easily, and accurately adjusted to a desired position, and which is capable of linking to other such devices to form extended assemblies with additional degrees of articulation. The present invention satisfies those needs, as well as others, and overcomes the deficiencies found in the coupling devices heretofore developed.

The foregoing patents reflect the state of the art of which the applicant is aware and are tendered with the view toward discharging applicant's acknowledged duty of candor in disclosing information which may be pertinent in the examination of this application. It is respectfully stipulated, however, that none of these patents teach or render obvious, singly or when considered in combination, applicant's claimed invention.

SUMMARY OF THE INVENTION

The present invention pertains generally to links which can be used to form ratcheting chained assemblies for coupling two objects in an articulating manner. By way of example, and not of limitation, a ratchet link in accordance with the present invention has generally planar faces and includes a cylindrically-shaped tongue at one end, a C-shaped socket at the other end, and a connecting bar which extends between the tongue and the socket. The socket is defined by a pair of opposing, spaced-apart, resilient arcuate prongs which extend outward from the device away from the tongue end. The inside radius of the socket is substantially the same as the outside radius of the tongue, so that the tongue can be inserted into the socket of another link. The socket includes a narrow centrally positioned slot along its circumference, and the tongue includes a narrow centrally positioned ring extending outward along its circumference which is received by the slot when the tongue is inserted into the socket. A plurality of spaced apart teeth are provided along the inside surface of the socket and extend between the faces of the device in a substantially perpendicular orientation to the plane of the faces. Similar teeth are located along the outside surface of the tongue. When the tongue is placed into the socket of another link, the teeth intermesh wherein the teeth in the tongue fit into the interdental notches between the teeth in the socket, and the teeth in the socket fit into the interdental notches between the teeth in the tongue. Lateral movement is prevented by the